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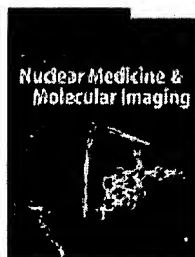
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**Content Types Subject Collections****Journal Article**

Continuous intraoperative external monitoring of
perfusate leak using iodine-131 human serum
albumin during isolated perfusion of the liver and
limbs

Journal	European Journal of Nuclear Medicine and Molecular Imaging
Publisher	Springer Berlin / Heidelberg
ISSN	1619-7070 (Print) 1619-7089 (Online)
Issue	Volume 22, Number 11 / November, 1995
Category	Original Article
DOI	10.1007/BF00801607
Pages	1242-1248
Subject Collection	Medicine
SpringerLink Date	Tuesday, December 21, 2004

**William C. Barker¹ , Mary P. Andrlich¹,
H. Richard Alexander² and Douglas L. Fraker²**

- (1) Nuclear Medicine Department, Warren Grant Magnuson Clinical Center, National Institutes of Health, 20892 Bethesda, MD, USA
- (2) Surgery Branch, National Cancer Institute, National Institutes of Health, 20892 Bethesda, MD, USA

Received: 1 June 1995 **Revised:** 7 June 1995

Abstract Regional isolated perfusion using tumor necrosis factor (TNF) shows significant promise for treatment of cancer which is limited to limbs or organs. The high toxicity of TNF requires very sensitive real time monitoring of leakage in order to avoid serious patient complications. Human serum albumin labeled with iodine-131 is used with an externally mounted and collimated NaI(Tl) detector to track the leakage of blood from the isolated perfusion blood circuit into the general systemic vascular space. Blood activity levels measured using the monitor demonstrated a very good correlation with blood serum samples taken concurrently with external monitoring. External monitoring can reduce the risks of perfusion leakage intraoperatively with the precision necessary to safely perform isolated perfusion using TNF.

Key words Perfusion, regional - Tumor necrosis factor - Iodine radioisotopes - Intraoperative monitoring

References

1. Creech OJ, Krementz ET, Ryan RF, Winblad JN. Chemotherapy of cancer: regional perfusion utilizing an extracorporeal circuit. *Ann Surg* 1958; 148: 616–632.
2. Biermann HR, Byron RL, Miller ER, Shimkin MB. The effects of intra-arterial administration of nitrogen mustard. *Am J Med* 1950; 8: 535.
3. Krementz ET, Creech OJ, Ryan RF, Wickstrom J. Treatment of malignant tumors of the extremities by perfusion with chemotherapeutic agents. *J Bone Joint Surg* 1959; 41: 977–987.
4. Stehlin JS, Clark RL, White EC, et al. Regional chemotherapy for cancer: experiences with 116 perfusions. *Ann Surg* 1960; 151: 605–619.
5. Steldin JS. Hyperthermic perfusion with chemotherapy for cancers of the extremity. *Surg Gynecol Obstet* 1969; 129: 305–308.
6. Hafstrom L, Hugander A, Jonsson PE, Westling H, Ehrsson H. Blood leakage and melphalan leakage from the perfusion circuit during regional hyperthermic perfusion for malignant melanoma. *Cancer Treat Rep* 1984; 68: 867–872.
7. Lejeune FJ, Lienard D, el Douaihy M, Seyedi JV, Ewalenko P. Results of 206 isolated limb perfusions for malignant melanoma. *Eur J Surg Oncol* 1989; 15: 510–519.
8. Neades GT, Evans WD, Mansel RE. Choice of agent and prediction of systemic toxicity in isolated hyperthermic limb perfusion. *Reg Cancer Treat* 1991; 3: 252–255.
9. Hoekstra HJ, Naujocks T, Koops HS, et al. Continuous leakage monitoring during hyperthermic isolated regional perfusion of the lower limb: techniques and results. *Reg Cancer Treat* 1992; 4: 301–304.
10. Alexander C, Omlor G, Berberich R, Gross G, Feifel G. Rapid measurement of blood leakage during regional chemotherapy. *Eur J Nucl Med* 1993; 20: 187–191.
11. Lejeune FJ, Lienard D, Leyvraz S, Mirimanoff RO. Regional therapy of melanoma. *Eur J Cancer* 1993; 4: 606–612.
12. Stehlin JS, Clark RL, Dewey W. Continuous monitoring of leakage during regional perfusion. *Arch Surg* 1961; 83: 165–171.
13. Sardi A, Minton JP, Mojzisek C, et al. The use of a hand-held gamma

detector improves the safety of isolated limb perfusion. *J Surg Oncol* 1989; 41: 172–176.

14. Lienard D, Ewalenko P, Delmotte JJ, Renard N, Lejeune FJ. High-dose recombinant tumor necrosis factor alpha in combination with interferon gamma and melphalan in isolation perfusion of the limbs for melanoma and sarcoma. *J Clin Oncol* 1992; 10: 52–60.
15. Thom AK, Alexander HR, Andrich MP, Barker WC, Rosenberg SA, Fraker DL. Cytokine levels and systemic toxicity in patients undergoing isolated limb perfusion with high-dose tumor necrosis factor interferon gamma and melphalan. *J Clin Oncol* 1995; 13: 264–273.
16. Shaw B Jr., Martin DJ, Marquez JM, et al. Venous bypass in clinical liver transplantation. *Ann Surg* 1984; 200: 524–534.
17. Goldberg ME, Rosenblum HM, Seltzer JL, Rosato FE. Isolated regional perfusion; anaesthetic technique, monitoring and blood replacement. *Can Anaesth Soc J* 1984; 31: 552–558.
18. Kroon BB. Regional isolation perfusion in melanoma of the limbs; accomplishments, unsolved problems, future. *Eur J Surg Oncol* 1988; 14: 101–110.

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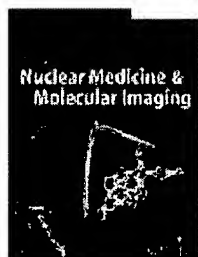
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EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	(422/44 422/45) and pump and oxygenator and "analysis gas" and sensor	USPAT	OR	OFF	2006/11/08 16:20
S2	1	blood and pump and oxygenator and "analysis gas" and sensor	USPAT	OR	OFF	2006/11/08 16:21
S4	3	pump and oxygenator and sensor and "isolated perfusion"	USPAT	OR	OFF	2006/11/08 16:35
S3	3	blood and pump and oxygenator and sensor and "isolated perfusion"	USPAT	OR	OFF	2006/11/08 16:35
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S6	1265	604/96.01	USPAT	OR	OFF	2006/11/08 17:02
S5	1	pump and oxygenator and sensor and ("laughing gas" or "N2.sub.O")	USPAT	OR	OFF	2006/11/08 17:02
S8	121	604/96.01 and analysis	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2006/11/08 17:07
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S9	6	604/96.01 and (analysis with gas)	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2006/11/08 17:25
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S16	13	leak and (gas with sensor) and extracorporeal and oxygenator	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2006/11/09 10:14
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EAST Search History

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S60	0	S57 and (leak adj3 detect\$3)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/05/02 11:01

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L1	2	MEISNER-andreas\$.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2007/05/02 15:36